Kolak, Shari

From: Kolak, Shari
Sent: Friday, May 02, 2014 1:52 PM
To: Tracy, Carol Hefferan (DEQ); Wagaw, Wally (DEQ)
Subject: Data Review Section of FYR for YOUR REVIEW
Attachments: Data Review Section for State reivew.docx

Carol and Wally,

Attached is the Data Review section that was revised based on our Headquarter's comments. I mainly added additional language to the Groundwater Trends discussion. PLEASE review to make sure the info is CORRECT. And PLEASE edit the section to read better (I didn't do a good job at this)....

Fixing the trend charts is not as important, at this point, as getting your input on the attached language. I can always replace the charts on Monday. So, if you could provide comments or make changes directly to the text, I can print it out and put the FYR thru sign-off. THANK YOUUUU!

Shari Kolak
Remedial Project Manager
U.S. EPA, Region 5
77 W. Jackson
Chicago, IL 60604
312-886-6151 wk
kolak.shari@epa.gov

Data Review

Commented [RS1]: Can you also discuss methane gas monitoring results in this section?

Groundwater MNA Remedy

The RA monitoring well network consists of 60 monitoring wells that are designed to monitor the performance of the MNA groundwater remedy. All 60 monitoring wells are sampled annually. Thirty-six of the 60 wells are sampled semi-annually. The RA monitoring well network consist of three groups of wells; Source Area wells (wells near or adjacent to landfill), Plume Area wells (within main plume area), and Sentinel wells (at downgradient edge of the groundwater plume). All 60 monitoring wells are sampled annually for VOCs, select natural attenuation parameters (i.e., methane, dissolved oxygen, etc.), and target parameters (1,4-dioxane, Tetrahydrofuran (THF), and Tert-butanol (TBA). All 36 wells sampled semi-annually are tested only for target parameters. A subset of the 36 wells is also tested for VOCs.

As discussed in the Technical Assessment below, the groundwater MNA remedy is effective in reducing biodegradable VOCs and cleanup goals are expected to be met within a reasonable timeframe. However, MNA is not effective in reducing concentrations of non-biodegradable VOCs, particularly 1,4-dioxane and THF. The 1,4-dioxane groundwater plume appears to be expanding and cleanup goals are not expected to be reached within a reasonable timeframe. Additional source control and/or contingent measures, in accordance with the 2005 Second ROD Amendment, need to be evaluated and implemented to reduce concentrations of 1,4-dioxane in the groundwater and prevent further expansion and continued migration of 1,4-dioxane into Van Buren County.

Table 5 – RA Monitoring Well Network

Source Area wells	Plume Area wells	Sentinel Wells
11 wells: M-8, MW-13, P-46, P-48, P-49, P-50, P-51, P-52, P-53, P-55 and TW-4	22 wells: MW-1, MW-12, P-19, P-20, P-21, P-24, P-25, P-27, P-28, P-29, P-30, P-31, P-36, P-43, P-44, P-56, P-57, P-61, P-63, P-66, P-67 and P-10711	27 wells: MW-15, P-32, P-33, P-42, P-34, P-35, P-37, P-38, P-39, P-40, P-41, P-45, P-54, P-58, P-59, P-60, P-62, P-64, P-65, P-68, P-69, P-70, P-71, P-72, P-73, P-74 and P-75

Exceedance of Groundwater Remedial Action Objectives

A total of 34 monitoring wells were sampled during the most recent (semi-annual RA sampling) groundwater sampling event in September 2013. Thirteen of 34 monitoring wells sampled during September contained VOC concentrations exceeding their respective Remedial Action Objectives (RAOs). The RAOs for groundwater are the Michigan Part 201 Residential Drinking Water Criteria (DWC).

The Part 201 DWC for the contaminants of concern at the Site are:

- 1,4-dioxane, 85 ug/L
- THF, 95 ug/L
- TBA, 3,900 ug/L
- Benzene, 5 ug/L

Eight monitoring wells in the plume area (P-36, P-44, P-56, P-57, P-61, P-63, P-66 and P-67) and five monitoring wells in the source area (P-49, P-50, P-51, P-53 and TW-4) sampled in September 2013 contained 1,4-dioxane concentrations exceeding the RAO. Concentrations of 1,4-dioxane ranged from 120 ug/L (in P-51 and P-57) to 410 ug/L (in P-53). Six monitoring wells (P-36, P-44, P-49, P-63, P-67 and TW-4) sampled in September 2013 also contained THF concentrations exceeded the RAO. Concentrations of THF ranged from 110 ug/L (in P-49) to 270 ug/L (in P-44). Twelve monitoring wells were sampled for Benzene in September 2013. Eight monitoring wells (P-46, P-48, P-49, P-50, P-51, P-52, P-53, and TW-4) sampled contained benzene concentrations exceeded the RAO. Benzene concentrations ranged from 12 ug/L (in P-46) to 270 in TW-4. No monitoring wells exceeded the RAO for TBA.

Monitoring wells with 1,4-dioxane concentrations exceeding RAOs are located within the source area and the main plume area. Monitoring wells with THF concentrations exceeding the RAO are located within the main plume area, with the exception of P-49 and TW-4, which is located within the source area. Monitoring wells with benzene concentrations exceeding the RAO are located within the source area.

Semi-annual RA groundwater sampling data collected in September 2013 can be found in Appendix B, Attachment 3.

Groundwater Trends

Groundwater trends were evaluated using sampling data collected during the annual, semi-annual, and quarterly groundwater monitoring events conducted to date. Select monitoring wells are discussed below for purposes of illustrating groundwater trends. Groundwater data, from 2009-2013, for all 60 RA monitoring wells can be found in the Annual RA (MNA) and Semi-annual RA Groundwater Monitoring Data Summary reports listed in Appendix C. The reports can also be found in the Administrative Record at the local repository identified in Section III of this FYR.

<u>Source Area Wells</u>

Monitoring wells P-53 and P-49 are located adjacent to the landfill. There is substantial variability in the contaminant levels observed in P-53. To illustrate this, a trend analysis was reviewed and compiled for the monitoring well P-53, which is located at the western edge of the landfill. During the April 2010 monitoring event, 1,4-dioxane was detected in P-53 at 290 ug/L. However, in April 2011, 1,4-dioxane was detected in P-53 at 1,000 ug/L. In April 2012, 1, 4-dioxane was detected in P-53 at 36 ug/L and in April 2013, 1,4-dioxane was detected in P-53 at

760 ug/L. The average trend for 1,4-dioxane in P-53 shows relatively stable conditions.

There is also substantial variability in benzene, THF, and TBA concentrations observed in P-53. During the April 2010 and April 2011 monitoring events, benzene was detected in P-53 at 260 ug/L and 380 ug/L, respectively. However, in April 2012, benzene was detected in P-53 at 42 ug/L and in April 2013, benzene was detected in p-53 at 210 ug/L. The average trend for benzene in P-53 show relatively stable conditions. P-53 also showed variability in THF concentrations. During the April 2010 and April 2011 monitoring events, THF was detected in P-53 at 68 ug/L and 80 ug/L, respectively. In April 2012, THF was detected in P-49 at 26 ug/L and in April 2013, THF was detected in P-53 at 110 ug/L. The average trend for THF in P-53 is decreasing conditions. Although TBA concentrations were variable and below the Part 201 DWC, the average trend for TBA in P-53 shows slightly decreasing or stable conditions.

The average trend for 1,4-dioxane in P-49 show slightly decreasing or stable conditions for 1,4-dioxane concentrations. During the April 2010 monitoring event, 1,4-dioxane was detected in P-49 at 450 ug/L. In April 2011, 1,4-dioxane was detected in P-49 at 300 ug/L. In April 2012, 1,4-dioxane was detected in P-49 at 260 ug/L and in April 2013, 1,4-dioxane was detected in P-49 at 270 ug/L. The average trend for benzene in P-49 show slightly decreasing or stable conditions. During the April 2010 monitoring event, benzene was detected in P-49 at 180 ug/L. In April 2011, benzene was detected in P-49 at 160 ug/L and in April 2012, benzene was detected in P-49 at 220 ug/L.

Sampling data for P-53 and P-49 from 2010-2013 is shown below. Trend charts for monitoring wells P-53 and P-49 from 2002 -2013 are in Appendix B, Attachment 4.

Table 6 –Sampling Results for Source Area Wells P-53 & P-49 (2010-2013)

P-53	**units**	**April 2010**	**October 2010**	**April 2011**	**October 2011**	**April 2012**	**October 2012**	**April 2013**	**September 2013**
1,4-dioxane	ug/L	**290**	**260**	**1,000**	**110**	36	**690**	**760**	**410**
THF	ug/L	68	15	80	16	26	**130**	**110**	41
TBA	ug/L	500	130	390	240	190	440	410	330
Benzene	ug/L	**260**	**89**	**380**	NS	**42**	NS	**210**	**160**

Bold indicates concentrations exceed Part 201 DWC
NS – not sampled

P-49	**units**	**April 2010**	**October 2010**	**April 2011**	**October 2011**	**April 2012**	**October 2012**	**April 2013**	**September 2013**
1,4-dioxane	ug/L	**450**	**430**	**300**	**310**	**260**	**210**	**270**	**260**
THF	ug/L	83	63	61	**170**	**130**	76	87	**110**

TBA	ug/L	620	560	510	640	570	620	530	490
Benzene	ug/L	**180**	**240**	**160**	**180**	**220**	NS	**160**	**170**

Bold indicates concentrations exceed Part 201 DWC
NS – not sampled

Plume Area Wells

P-66
Monitoring well P-66 is located within and near the western extent of the contaminant plume. During the April 2010 monitoring event, 1,4-dioxane was detected in P-66 at 99 ug. In April 2011, 1,4-dioxane was detected in P-66 at 92 ug/L. In April 2012, 1,4-dioxane was detected in P-66 at 95 ug/L and in March 2013, 1,4-dioxane was detected in P-66 at 130 ug/L. Sampling data shows an increasing trend for 1,4-dioxane in P-66. Although below the Part 201 DWC, sampling data shows an increasing trend for TBA and THF concentrations in P-66.

P-67
Monitoring well P-67 is located within and near the western extent of the contaminant plume. During the April 2010 monitoring event, 1,4-dioxane was detected in P-67 at 120 ug/L. In April 2011, 1,4-dioxane was detected in P-67 at 160 ug/L. In April 2012, 1,4-dioxane was detected in P-66 at 140 ug/L and in March,1,4-dioxane was detected in P-67 at 190 ug/L. Sampling data shows an increasing trend for 1,4-dioxane in P-67. Sampling data also show an increasing trend for THF in P-67. Although below the Part 201 DWC, sampling data show an increasing trend in TBA concentrations in P-67.

826 Wickford

The residential well at 826 Wickford is located near the downgradient extent of the plume. During the April 2009 monitoring event, 1,4-dioxane was detected at 15 ug/L. In April 2010, 1,4-dioxane was detected at 18 ug/L and in April 2011, 1,4-dioxane was detected at 49 ug/L. Although below Part 201 DWC, sampling data shows an increasing trend for 1,4-dioxane at 826 Wickford. Sampling data also shows an increasing trend for THF and TBA at 826 Wickford, although concentrations were below the Part 201 DWC. This residential property was connected to municipal water in September 2011.

Sampling data for P-66 and P-67 from 2010-2013 is shown in Table 7. Sampling data from 826 Wickford (2009-2011) is shown in Table 8. Trend charts for monitoring wells P-66 (2006-2013) and P-67 (2009-2013) are in Appendix B, Attachment 5. A trend chart for 826 Wickford (2002-2011) is in Appendix B, Attachment 6.

Table7 – Sampling Results for Plume Area Wells P-66 & P-67 (2010 -2013)

P-66	units	April 2010	October 2010	April 2011	October 2011	April 2012	October 2012	March 2013	September 2013

1,4-dioxane	ug//L	**99**	**88**	**92**	**110**	**95**	**93**	**130**	**140**
tetrahydrofuran	ug//L	41	52	52	54	**120**	68	78	88
Tert-butanol	ug//L	310	250	340	360	370	580	470	430

Bold indicates concentrations exceed Part 201 DWC

P-67	units	April 2010	October 2010	April 2011	October 2011	April 2012	October 2012	March 2013	September 2013
1,4-dioxane	ug//L	**120**	**130**	**160**	**150**	**140**	**120**	**190**	**170**
tetrahydrofuran	ug//L	80	**97**	**120**	**100**	**160**	**110**	**150**	**160**
Tert-butanol	ug//L	330	340	430	450	440	420	570	530

Bold indicates concentrations exceed Part 201 DWC

Table 8 – Sampling Results for 826 Wickford (2009-2011)

826 Wickford	units	April 2009	August 2009	October 2009	April 2010	October 2010	April 2011
1,4-dioxane	ug//L	15	8	8	18	18	49
tetrahydrofuran	ug//L	5	ND	ND	5	ND	10
Tert-butanol	ug//L	70	40	40	80	160	290

Bold indicates concentrations exceed Part 201 DWC
ND – Non-detect

Sentinel Wells

Not all sentinel monitoring wells at the leading edges of the plume have sufficient data to determine trends in concentrations since the wells were installed fairly recently. However, it appears that contaminant concentrations at the furthest downgradient/leading edge of the plume (Van Kal Street North of West Main) continue to increase (but still remain below Part 201 DWC of 85 ug/L). The two most downgradient monitoring wells, P-70 and P-71, had 1,4-dioxane levels of 11 ug/L and 16 ug/L, respectively in October 2011. In October 2012, P-70 and P-71 had 1,4-dioxane levels of 14 ug/L and 13 ug/L, respectively. In March 2013, P-70 and P-71 had 1,4-dioxane levels of 21 ug/L and 20 ug/L, respectively. In September 2013, P-70 and P-71 had 1,4-dioxane levels of 24 ug/L and 22 ug/L, respectively.

Sampling data for P-70 (2010-2013) and P-71 (2011-2013) are shown below. Trend charts for P-70 and P-71 are in Appendix B, Attachment 7.

Commented [RS2]: Can you briefly describe here whether the trends is increasing, decreasing or stable?

Table 9 –Sampling Results for Sentinel Wells P-70 & P-71 (2010/2011-2013)

P-70	Units	October 2010	April 2011	October 2011	April 2012	October 2012	March 2013	September 2013 *
1,4-dioxane	ug//L	8.6	11	11	13	14	21	24
tetrahydrofuran	ug//L	< 2	< 2	< 2	< 2	<2	6.7	5.4
Tert-butanol	ug//L	< 5	< 5	7.6	9.1	13	20	22

*-P-70 installed in May 2010
* Quarterly sampling occurred in September instead of October.

P-71	units	October 2011	April 2012	October 2012	March 2013	September 2013*
1,4-dioxane	ug//L	16	13	13	20	22
tetrahydrofuran	ug//L	< 2	2.4	2.7	4.1	6.7
Tert-butanol	ug//L	19	18	23		33

NS= Not sampled
*= P-71 installed in September 2011
*Quarterly sampling occurred in September instead of October.

Overall Conclusions

There does not appear to be significant decreasing concentrations of contaminants released from the landfill especially when comparing sampling data from Source Area wells. Large fluctuations in 1,4-dioxane in P-53 and/or stable conditions in P-49 indicate that contaminant mass is still leaving the landfill. There is also an increasing trend in some plume area wells, which indicate the plume is expanding. This is based on contaminant concentrations for two monitoring wells, P-66 and P-67, located within and near the western extent of the contaminant plume, and for the residential well located at 826 Wickford. Plume expansion is evident by comparing isoconcentration maps for 1,4-dioxane and THF from the Spring 2011, 2012, and 2013. See Appendix B, Figures 7, 8 and 9.

The performance standard for success of MNA is that contaminants show decreasing concentrations, not just stable ones. Increasing trends at any location as well as the stable trends indicate that MNA is not remediating the groundwater and the plume is not shrinking. Source control is a fundamental part of MNA. Without effective source control, contaminant loading to the aquifer will continue, plume expansion will continue, and MNA will not meet cleanup goals within a reasonable timeframe. Under this situation, the MNA remedy will also not meet its performance standard of returning the aquifer to a usable condition.